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Description of a new species of hardyhead, *Craterocephalus fistularis*, (Pisces: Atherinidae) from Irian Jaya

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Abstract – A new species of hardyhead, *Craterocephalus fistularis*, is described from Lake Kamakawaiar (Triton Lakes 3°47'S 134°14'E) in Irian Jaya. This fish is distinctive with upper and lower jaws slightly extended, giving the mouth a flute or funnel-like appearance. The scales covering body and head are crenulated. It has no external dentition; its teeth are small and not visible when the mouth is closed. Its lips are thick with a very thick labial ligament lying alongside the dentary. The new species is aligned with the *C. stercusmuscarum* group. Superficially, it resembles *Craterocephalus lacustris* but differs from that species and from all other members of the genus osteologically and meristically.

INTRODUCTION

Until about 1986, only 12 species of *Craterocephalus* (hardyheads) were known. In the next eight years extensive collecting and systematic work on this genus had, by 1990, increased the number to 24 with only one of these (*Craterocephalus nouhuysi*) being found in Irian Jaya. The new species, *Craterocephalus fistularis*, was collected from a lacustrine habitat, Lake Kamakawalar (3°47'S 134°14'E) in western in Irian Jaya.

The genus *Craterocephalus* has been divided into three groups by Ivantsoff *et al.* (1987), Crowley and Ivantsoff (1988; 1992), and Crowley (1991). The external morphology and osteology align the new species with the *C. stercusmuscarum* group. The distinguishing external characters of this group include a relatively slender body (when compared with *C. eyresii* group) and thin body scales. The dark midlateral band running from snout to caudal peduncle, which is generally characteristic of the *C. stercusmuscarum* group, is, however, only faintly visible in the new species running from the pectoral fin origin to caudal peduncle. *Craterocephalus fistularis* shares with members of the *C. stercusmuscarum* group fused 5th ceratobranchial bones, urohyal with ventral pocket and wings, pectoral girdle with small scapular foramen and corocoid shelf present and well developed interdorsal pterygiophores (For detail see Crowley and Ivantsoff 1992)

MATERIALS AND METHODS

Two specimens were available for morphometric measurements and meristic counts. One specimen was cleared and stained for osteological analysis after measurements and counts had been made. Clearing and staining followed the methods of Taylor (1967). Measurements and counts follow the methods of Ivantsoff *et al.* (1987). Results in Table 1 compare the new species with its potentially closest relative, *C. lacustris*, from Lake Kutubu in Papua New Guinea.

SYSTEMATICS

Craterocephalus fistularis sp. nov.
Figure 1

Holotype

MZB 6114 (76.6 mm SL) Lake Kamakawaiar, (3°47'S 134°14'E), Triton Lakes, Irian Jaya. Collected by Dr. G.R. Allen and D. Price, 14 May 1991. Seine in shallow water (0.5–1.5 m) along the eastern shore, near the southern tip of the lake.

Paratype

WAM P.30519–002 (58.5 mm SL) data as for holotype. This specimen was cleared and stained for osteological analysis

Diagnosis

Moderately robust freshwater fish, mouth small, gape very restricted. Labial ligament and lips very thick (Figure 2A). Lips with continuous flap at free edge. Gill rakers in lower gill arch (14–15) short and stumpy, with minute spinules. Transverse scales 8.5. Predorsal scales 22–23. Body scales crenulated and almost square (Figure 2E). Scales covering interopercle as far as vertical through anterior edge of orbit. Infraorbitals very broad

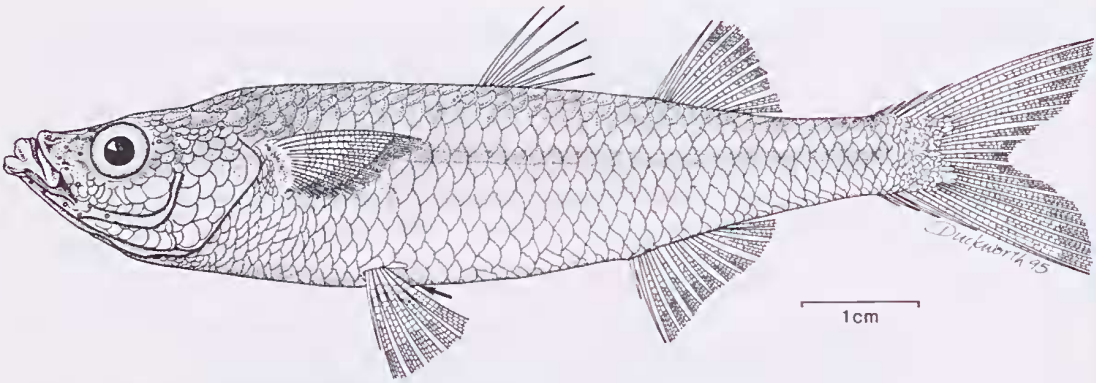

Figure 1 Holotype of *Craterocephalus fistularis* MZB 6114.

(Figure 2E). Large number of predorsal scales unique for this species. No other species of freshwater *Craterocephalus* has crenulated scales.

Description

Member of the *C. stercusmuscarum* group but with moderately deep body. Mouth in larger fish extended forward giving pipe or funnel-like appearance. Gape restricted by labial ligament more than half way along free edge of premaxilla (Figure 2A). Needle-like teeth on medial third of premaxilla and dentary; other bones of mouth edentulous. Scales on dorsum of head irregular, as far as vertical through anterior pupil of eye. Midlateral scales 37–38. Position of anus from 2 to 4 scales behind tips of pelvic fins; origin of first dorsal fin from 1 to 1.5 scales in front of tips of pectoral fins. For details of all measurements and counts and a comparison with *C. lacustris* see Table 1.

Osteological characters

Dorsal process of premaxilla long, reaching into interorbital space. Lateral ramus of premaxilla not reaching to vertical through anterior edge of orbit. Coronoid process of dentary highly elevated, 5th ceratobranchial bones fused. Scapular foramen small; corocoid shelf large. Anal plate not extended forward as in most other members of *C. stercusmuscarum* group Differs from *C. lacustris* and from all other species of *Craterocephalus* by a combination of the following: Shape and extent of labial ligament (Figure 2A), shape of premaxilla and maxilla (Figures 2B, 2C), coronoid process of dentary rounded anteriorly (Figure 2D), width of infraorbital bones (Figure 2E). The new species also differs from other members of the *C. stercusmuscarum* group in: shape of basihyal, epibranchials, hyomandibular metapterygoid and interdorsal pterygiophores. In other species of *C. stercusmuscarum* group, basihyal bone slender with short associated cartilage; in *C. fistularis* basihyal bone robust with well defined triangular shelf on ventral aspect; associated cartilage reduced to small pad. Epibranchial bones of *C. fistularis* relatively robust (slender in other species); *C. fistularis* hyomandibular with distinct posterior projection for articulation with opercle (no distinct projection in other species). Metapterygoid small in *C. fistularis*; medium to large in other *C. stercusmuscarum* group species. *Craterocephalus fistularis*, interdorsal pterygiophores large with well developed descending process; in all other *Craterocephalus* species interdorsal pterygiophores small, vestigial or absent.

Colour

Preserved specimens pale yellowish buff; paler towards abdomen. Faint midlateral band from origin of pectoral fin to base caudal fin. Midlateral band initially very thin line to vertical through origin of first dorsal fin, then slightly wider (less than scale width). Midlateral band absent from snout through eye. Melanophores above midlateral band faint, reticulate pattern not apparent. Melanophores lacking on abdomen. Dorsum of head dusky. Snout and lips peppered with melanophores. Eyes silvery black. Fins clear with few melanophores along rays.

Etymology

fistularis from the Latin for pipe or flute, referring to the shape of the mouth.

Distribution

This new species is presently known only from Lake Kamakawalar, Irian Jaya.

Discussion

Craterocephalus fistularis shares with the *C. stercusmuscarum* group all of the osteological characters given above. These characters can be used to define the group and to differentiate members of the group from members of both the

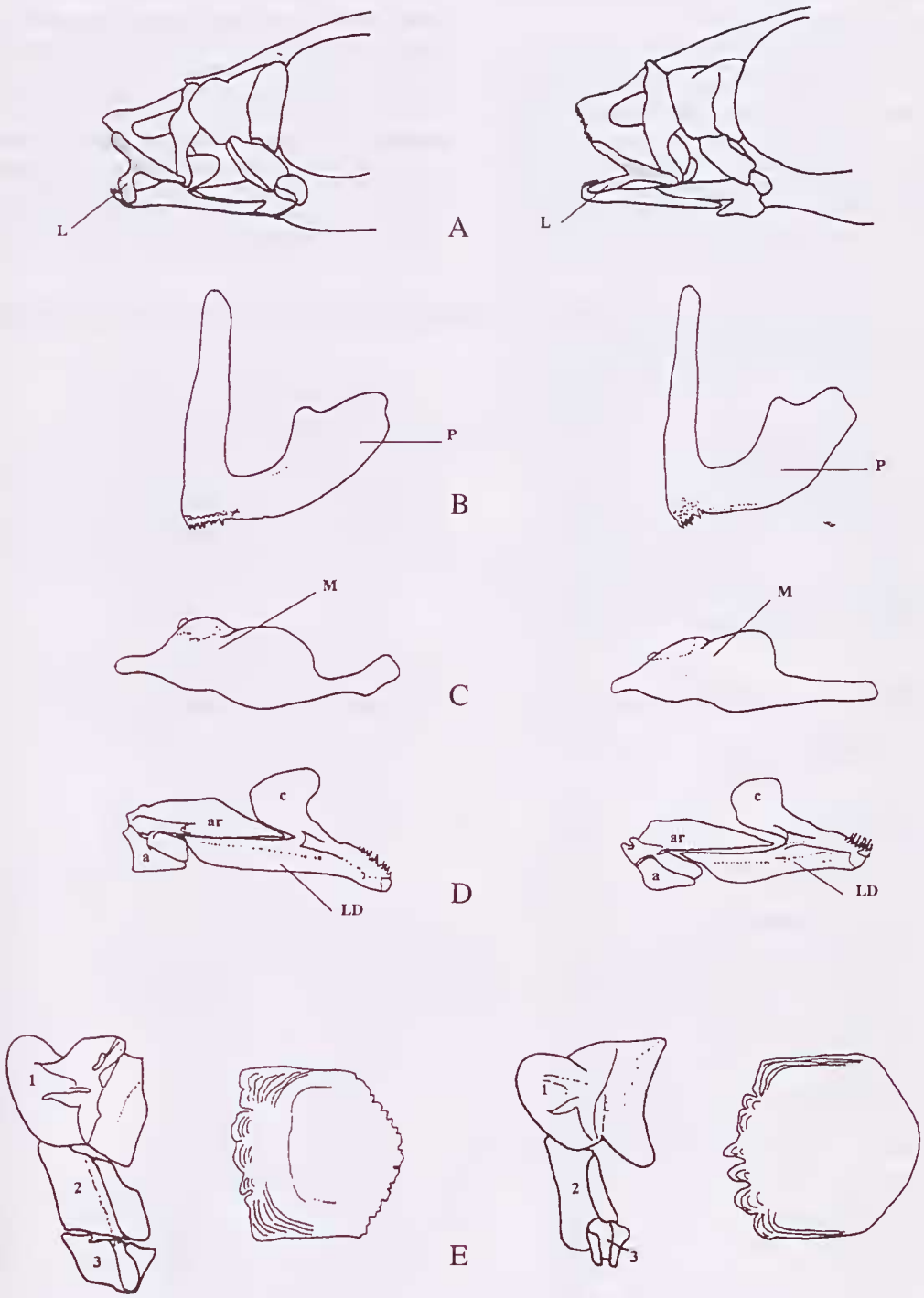

Figure 2 A, Lateral view of mouthparts and labial ligament (L) in *C. fistularis* (left) and *C. lacustris* (right); B, Lateral view of premaxilla (P); *C. fistularis* (left) and *C. lacustris* (right); C, Lateral view of maxilla (M); *C. fistularis* (left) and *C. lacustris* (right); D, Medial view of left dentary (LD) showing: a, angular; ar, articular; c, coronoid process; *C. fistularis* (left) and *C. lacustris* (right); E, Infraorbitals 1–3 (1, 1st infraorbital; 2, 2nd infraorbital; 3, 3rd infraorbital) and scale of *C. fistularis* (left) and *C. lacustris* (right).

C. eyresii group and the *C. honoriae* (marine) group (Crowley and Ivantsoff 1992).

Although members of the *C. stercusmuscarum* group are genetically and morphologically very similar, the new species has a number of unique characters, in particular the crenulate scales, number of predorsal scales and extent of labial ligament. Despite these characters, *Craterocephalus fistularis*, is most closely related to *C. lacustris* on the basis of osteological and morphological characters. *Craterocephalus lacustris* is a lacustrine hardyhead species found in Lake Kutubu, Papua New Guinea. Crowley *et al.* (1991) have shown how closely related genetically are the other members of the *C. stercusmuscarum* group, from the southern drainages of Papua New Guinea and Irian Jaya. However, it was not possible to find the genetic affinities of the new species as no fresh or frozen material was available for electrophoretic analysis.

The number of freshwater hardyhead species of the *C. stercusmuscarum* group now known from Papua New Guinea and Irian Jaya, is the same as

Table 1 Comparison of holotype and paratype of *Craterocephalus fistularis* with *C. lacustris*. Last double ray of second dorsal and anal fins counted as one.

Character	*C. fistularis* holotype	*C. fistularis* paratype	*C. lacustris* (n=42)
In SL (standard length)			
Head Pectoral length	3.2	3.3	3.4(3.2–3.8)
Max. body depth	5.1	7.2	6.4(5.1–9.4)
Min body depth	4.2	4.4	4.6(3.5–6.0)
Pec/anus	10.7	11.2	11.7(10.6–12.9)
SnOD1	2.8	3.1	3.4(3.0–4.0)
SnOD2	1.9	1.9	2.1(2.0–2.2)
SnOV	1.4	1.4	1.4(1.4–1.5)
SnTV	2.2	2.3	2.3(2.2–2.4)
SnOA	1.7	1.7	1.7(1.6–1.8)
SnTA	1.4	1.4	1.5(1.4–1.6)
	1.2	1.3	1.2(1.0–1.5)
In Head			
Eye	4.1	3.5	3.4(2.9–5.0)
Interorbital	2.9	3.1	3.2(2.9–3.6)
Postorbital	2.3	2.4	2.3(2.0–2.7)
In Eye			
Snout	0.7	1.0	1.2(0.7–1.5)
Premaxilla	0.8	1.1	1.1(0.7–1.4)
Lips in premaxilla	1.7	1.6	2.0(1.5–2.4)
Premax. process	1.0	1.4	1.3(0.8–1.9)
Meristics			
Scales and vertebrae			
Midlateral	38	37	34.3(32–38)
Transverse	8.5	8.5	7.3(6–8)
Predorsal	23	22	13.8(11–18)
Interdorsal	7	8	7.4(6–9)
Vertebrae	–	36	36.5(35–39)
Finrays			
First dorsal	6	5	7.1(5–8)
Second dorsal	Ii 7	Ii 6	Ii 6–8
Anal	Ii 9	Ii 8	Ii 7–9
Pectoral	Ii 13	Ii 13	Ii 11–15
Other			
Gill rakers	14	15	11.7(10–13)
Posit anus	B4	B1.5	F1(F0–2)
OD1–TV	F1	F1.5	F5.2(F3–7.5)
OD1–TPec	B2	B2	B0.8(F1–B3)
OV–TPec	F3	F2.5	F1.5(F0–3)

Abbreviations: Pec/anus – length from origin of pectoral fin to anus; Posit. anus – position of anus in relation to tips of ventral fins; OD – origin of first dorsal fin; OD2 – origin of second dorsal fin; OV – origin of ventral fin; Sn – snout; OA – origin of anal fin; TA point of insertion of last double ray of anal fin; TV – tips of ventral fins; TPec – tips of pectoral fins; F or B – number of scales in front of or behind reference point

in the whole Australian mainland – that is five species in each country. However, there are greater differences between the new species *C. fistularis* (see above) and the other members of the *C. stercusmuscarum* group from Papua New Guinea/ Irian Jaya (Crowley and Ivantsoff 1992) than there are between all Australian species of this group. The difference might be attributed to longer separation from the main *C. stercusmuscarum* ancestor (Crowley *et al.* 1991) or to increased ecological pressures. Until electrophoretic studies can be carried out on the new fish to assess its genetic relationships with other members of the group, the answer to the question of its marked differences must remain unknown.

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